Characteristics

1 Superior Material
Nippon Steel production system begins with advanced metallurgy and clean BOF steelmaking practices. After continuous casting, at hot-rolling process, hot-rolled strip of optimum quality for pipe making is produced.

2 High Dimensional Accuracy
High uniform wall thickness and smooth finish free from nonmetallic inclusions and surface defects provide Linepipe with a superior level of quality and excellent dimensional accuracy as well as high performance properties.

3 Variety of Products
- High strength linepipe
- High toughness linepipe
- Anti-Sour linepipe
- OCTG pipe

4 High Reliability of Weld
The unique welding condition control and monitoring system ensures quality of the weld along its entire length.

5 Excellent Quality
From steelmaking to pipe manufacture, quality is strictly controlled through every production step to ensure pipe products. Testing and inspection include body lamination UST, highly sensitive UST for weld seam, hydrostatic testing and numerous mechanical tests.

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24-inch Mill Manufacturing Process

Blast Furnace → Basic Oxygen Furnace → Degassing → Continuous Casting → Slab → Hot Strip Mill → Uncoiling, Leveling, Shearing → Edge Milling → Coil Edge UST

Forming → PWP HF-Welder → Outside and Inside Weld Bead Removing → Seam Heat Treatment → Sizing → Pipe Body UST → Cutting

Straightening [0.414 inches (355.6mm)] → Facing → Flattening Test → Hydrostatic Test → Seam UST → Final Inspection

Products → Drift Test and Inspection → Threading and Beveling → Coupling Power Tightening → Final Inspection → Products
16-inch Mill Manufacturing Process

Blast Furnace → Basic Oxygen Furnace → Degassing → Continuous Casting → Hot Strip Mill → Slitting → Uncoiling → Leveling → Shearing and Welding → Looper → Edge Milling → X-Ray Gauge

Forming → PWP HF-Welder → Outside and Inside Weld Bead Removing → Seam Heat Treatment → Cooling → Sizing → Straightening → Cutting

Hydrostatic Test → Straightness Inspection → Pipe End UST and Wall Thickness Inspection → Outside Diameter and Roundness Inspection → EMT → Pipe Body UST → Seam UST → Facing

Flattening Test → Inspection → Weighing → Length Measuring → Marking → Die Stamping → UV Coating → Products

Threading → Coupling Screw-on and Power Tightening → Hydrostatic Test and Drift Test → Products
**Principal Processes**

<table>
<thead>
<tr>
<th>Process Name</th>
<th>Details</th>
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<tbody>
<tr>
<td><strong>Steelmaking</strong></td>
<td>Degasassing and desulphurizing during steelmaking process supply clean steel with low non-metallic inclusions.</td>
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<tr>
<td><strong>PWP HF–Welder</strong></td>
<td>Perfect Welding Process, developed by Nippon Steel, produces high-quality weld. A welded seam is inspected by ultrasonic tester.</td>
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<tr>
<td><strong>Hot Rolling</strong></td>
<td>Advanced hot rolling supplies hot coils with fine grain structure and high dimensional accuracy.</td>
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<tr>
<td><strong>Welded Seam Heat Treatment</strong></td>
<td>Seam heat treatment homogenizes microstructure and physical properties at welded zone as same as those of base metal. Exact seam position is indicated by fluorescent marker for weld seam tracking.</td>
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**HF–ERW Weld Heat Input Control**

1. **Welding Phenomena**
   Varying combinations of welding heat input, welding speed, pipe wall thickness, etc. produce different weld results.

   - **Classification of Welding Phenomena**
   - **Fluctuation Patterns of Oscillation**

2. **Weld Heat Input Control**
   Welding conditions are monitored and controlled within the optimum range by using our unique weld heat input system to minimize oxides included in the weld seam.
Nippon Steel’s ERW pipe mills produce pipe with outside diameters from 4-1/2 inches (114.3 mm) to 24 inches (609.6 mm). The equipment to produce such pipes reflects Nippon Steel’s intent to meet the great demand for larger and heavier steel pipe.

Wall Thickness
To produce pipe with wall thickness up to 0.866 inches (22 mm) Nippon Steel has installed large scale forming & welding equipment.

Length
Nippon Steel’s ERW mills can produce pipes with length up to 60 feet (18.3 m). These long pipes reduce the number of weld joints and inspections necessary at the site, thus leading to faster construction and lower costs.